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| 14. ABSTRACT<br>The concept of the Common Operational Picture (COP) was created to provide the operational commander with improved situational awareness. Numerous organizations have developed conceptual frameworks regarding the technical aspects of developing a COP. Two notable frameworks are the Network Centric Warfare, and System of Systems approaches. In addition to technical challenges, there exists a need to address the proper display, use, and interpretation of the data contained in the COP.<br>Each level of command has a unique perspective on issues that enter the staffing process. The COP is no different. Interpretations of the COP may vary with the perspectives and experiences of the staffs. As a result, a common picture may not guarantee a common understanding of the battlespace.<br>To ensure that the operational commander gets the situational awareness he desires, the staffs of the services and the Combatant Commander need to address doctrinal, personnel, training and organizational issues. |                             |                              |                            |  |   |
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Does a Common Operational Picture Result in Common Understanding of the Battlespace?

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: \_\_\_\_\_

18 May 2004

## **A Picture is Worth a Thousand Words**

If a picture is worth a thousand words then applying this old adage to the topic at hand begs the question ... does the Common Operational Picture (COP) articulate the same thousand words to each observer? It is my thesis that the Common Operational Picture is a valuable tool with which to gain situational awareness of the battlespace, however it is only a snapshot of data and is subject to varied interpretations based on the perspectives of the observers. The further an observer is removed from the process of developing the COP (tactical, operational, strategic level of command) the greater the chance of misinterpreting the snapshot. Additionally, the varied responsibilities at each level of the chain of command will cause each level to display the COP differently based on the relevance of the data with regard to the commands responsibilities. The result is the potential for non-common understanding of the battlespace.

In pondering this issue it is useful to consider a lesson on observation and perception taught in basic psychology. Several people are tasked to observe a party then describe it. After observing the same party each person describes a very different scene. One thinks the music is too loud and therefore describes an obnoxious party; another focuses on a couple having an argument and describes a party with negative vibes. A third observer sees people laughing on the dance floor and describes a fun party. Each person's perception of the party was determined by what he happened to focus on, and how he categorized that information based on past experience, as well as motivational, personal, and social factors<sup>1</sup>.

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<sup>1</sup> Jerome S Bruner, "Beyond the Information Given." W.W. Norton & Company Inc. New York (1973), pp 7-31.

From the lesson above it is reasonable to conclude that the operational commander should exercise caution in assuming accuracy and assigning relevance to the operational picture<sup>2</sup>. The commander must realize that what is relevant at the operational level is not necessarily relevant at the tactical level where the data that feeds the COP is being developed. The divergence in relevance becomes more pronounced as the information being observed approaches real time and begins to look more like a tactical picture.

Because the COP is not really a picture, but rather a pictorial depiction of data that can be manipulated by the user, the users' experience with the battlespace combined with their current level of responsibility (strategic, operational, tactical) will drive what the observer *chooses* to display on their COP and how that display is interpreted.<sup>3</sup> Friction between choice and commonality can become problematic. Can two observers be assumed to have a common picture and common understanding of events if, at the same time, they are allowed a choice in determining what data is being displayed and observed on their respective pictures?

Let us suppose that a common data base data is achievable and let us refer to this data as the Common Tactical Picture (CTP).<sup>4</sup> The Common Tactical Picture, as the name implies, is created at the tactical level by operators with a high degree of experience with the data contained in the CTP, and with data not allowed into the CTP. To form a COP, data from multiple CTPs are correlated and fused together creating a new data base that is used to build the COP. To bring the various CTPs together is no small task and the lack of a cohesive

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<sup>2</sup> Bruner discusses veridicality which refers to the degree that an observer's perception of a scene is accurate and predictive. People categorize what they observe based on past experiences and familiarity with that which is being observed. The less familiar one is with a scene the more difficult it is to correctly perceive its meaning.

<sup>3</sup> Information displayed on a COP is manipulated using software tools (often called the gooey) such as filters that determine what information is or is not displayed. Given the wide latitude of choices and display options, it is likely that no two visual displays of the COP are exactly the same. Only the same is the data.

information technology community in the military creates a situation in which the COP is not of sufficient accuracy for the operational commander to make effective decisions.<sup>5</sup>

Moreover, lack of familiarity with the data in the COP (even though it may be perfect) makes it less likely that the operational level of command will be able to go beyond the data and extrapolate meaning beyond the data (knowledge).<sup>6</sup>

If one accepts that data is nothing more than facts, then it is of little use without the context that comes from personal understanding of how the data was developed and where it came from. It is important to point out that not all available data is allowed onto the CTP, nor is all data from the various CTPs allowed onto the COP. Operators at the tactical level realize this, however, the absence of information managers at the COP level creates a situation where the COP is not well understood and may lead to the dangerous illusion that the COP has enough fidelity for the operational commander to take over tactical control and direct specific engagements. Although the operational commander may need to assume tactical control in some instances, his staff is too far removed from the data to provide adequate context and the lack of an information management staff at the operational level forces that commander into a situation where he is reacting to data rather than exercising command and control based on a common understanding and knowledge of the battlespace. The objective in developing the CTP and subsequently the COP is to turn plentiful raw data

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<sup>4</sup> Commander, Joint Chiefs of Staff Manual 3115.01. Joint Data Networks Operations Manual. 1 September 2001.

<sup>5</sup> In this text an informational technology community, or data management community, does not refer to technicians or classic communication type personnel who wire together a local area network. Rather, the term information technology community refers to operational warfighters that specialize in developing CTPs and COPs (a J-3 type person with J-6 training). This community of operators requires extensive knowledge of the sensors systems and the communication systems that contribute data to form the CTP or COP. These specialists would be an instrumental part of the planning team since they would understand how data must come together to become knowledge.

<sup>6</sup> Jerome S Bruner, "Beyond the Information Given." W.W. Norton & Company Inc. New York (1973), pp 218-237.

into knowledge. Until shortcomings in staff organizational relationships and personnel are properly addressed the operational commander will still be asking the tactical commander “are you looking at what I’m looking at.”

*“For whoever just lets the facts speak for themselves will either be enveloped in silence or be deafened with noise.”<sup>7</sup>*

### ***Is a Common Data Base Possible?***

To delve into the issue of common pictures I consider two conceptual frameworks that describe a vision of information sharing that, among other things, will lead to a COP: 1) the Network Centric Warfare approach, and 2) the Systems of Systems approach. To discuss the likelihood of common understanding of the battlespace I consider the differences between *knowledge and data* and the effects of the human condition on interpretation of data.

At a fundamental level a common data base is achievable. On a limited scale it has been demonstrated; however, for the near term, commonality may not be as likely as visionaries would hope for, mostly due to the absence of an information technology community in the military to overcome the friction of bureaucracy and advocate the changes necessary to develop a true COP. To frame the discussion I outline the two conceptual frameworks listed above. Each approach relies on the dual assumptions that the U.S. military is in the midst of a Revolution in Military Affairs (RMA) and that information technology plays a large role in the RMA. Both concepts envision dramatic improvements in the COP by 2010 and predict near-perfect situational awareness/dominant battlespace awareness in the

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<sup>7</sup> Forster, Malcolm. Philosophy of Science Wisconsin Style. Philosophy 220. <<http://philosophy.wisc.edu/Forster.220/Notes3.html>> [4 May 2004].

2020 timeframe. In reviewing the literature (largely broad brush in nature) each approach appears similar. However, there are some subtle differences in the degree to which each concept relies on information technology to carry the day and consequently how each approach might result in different C2 relationships if implemented in the U.S. military.

### ***Network Centric Warfare***

Vice Admiral Arthur K. Cebrowski, USN (Ret) and John Garstka describe Network Centric Warfare (NCW) in terms of a business model that has “emerged in the modern economy” in which information technology plays a central role.<sup>8</sup> The fundamental theme is that the military will transform its capabilities by switching from “platform centric” to “network centric” warfare. Cebrowski makes a compelling argument for this shift by describing NCW’s worth to the military in terms of Metcalfe’s Law. Thus “Network-centric computing is governed by Metcalfe’s Law, which asserts that the ‘power’ of a network is proportional to the square of the number of nodes in the network.”<sup>9</sup> The implication is that networking military computers and combat systems will produce an exponential increase in computing power, ultimately rendering a COP possible.

The information superiority derived from network-centric warfare hypothetically makes possible transformational capabilities such as massing of effects rather than massing of forces (presumably to achieve those same effects). An additional assertion of NCW proponents is that the complexity of warfare is best addressed by a bottom-up organization.

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<sup>8</sup> Arthur K. Cebrowski and John Garstka, “Network-Centric Warfare: Its Origins and Future.” U.S. Naval Institute Proceedings (January 1998), pp. 1-2.

<sup>9</sup> Ibid., p. 3.

NCW enables this by providing lower echelons with an enhanced level of situational awareness allowing them to “self-synchronize” complex warfare activities.<sup>10</sup>

Let us assume that NCW will lead to a COP. However, it is appropriate to point out that many challenges to the validity of the NCW business model exist. One argues that NCW proponents misuse Metcalfe’s Law by asserting that the military gains “power from the interactions” on the network, whereas Metcalfe’s Law actually assigns “value to the network.”<sup>11</sup> Additionally, NCW proponents assert that it will create an environment supportive of the concept of decentralized execution. The argument made is that lower echelons will be empowered with information previously only available at the operational level. The problem with this argument is that it treats the information flow as a one-way street with the benefactors of increased data traffic being lower echelons. However, it is actually a two-way street where the operational-level staffs will have increased access to perishable tactical data and may be tempted to inject themselves into tactical level decision making.

### *System of Systems*

This conceptual framework resembles NCW in its emphasis that a Revolution in Military Affairs, enabled by ever more powerful information technology, makes it possible to network military computing systems. The concept recognizes the existence of numerous separate technical applications that together form a “system of systems.”<sup>12</sup> As Admiral

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<sup>10</sup> Ibid., pp. 6-10.

<sup>11</sup> Lieutenant Colonel Ralph E. Gibbon and Darryn J. Reid, “A WOVEN WEB OF GUESSES: CANTO ONE. Network Centric Warfare and the Myth of the New Economy” Proposal to the 8<sup>th</sup> International Command and Control Research & Technology Symposium., pp. 7-8.

<sup>12</sup> Admiral Bill Owens and Ed Offley, Lifting the Fog of War. (Baltimore, MD: The John Hopkins University Press, 2001), p. 99.



Owens describes the system of system its *applications* are Intelligence Surveillance and Reconnaissance (ISR); Advanced Command Control Communication Computers and Intelligence (C4I); and Precision Force. When these applications are connected, creating a system of systems, the synergy created produces the conditions of Dominant Battlespace Knowledge, Near-Perfect Mission Assignment, and Immediate/Complete Battle assessment. The Common Operational Picture is composed of data provided by ISR sensors and manipulated by the advanced C4I systems; therefore resides within Dominant Battlespace Knowledge.

Owens believes that for a Revolution in Military Affairs to occur, and subsequently affect the acquisition process, a unified command structure is necessary to remove service oriented prioritization for weapons and equipment research and procurement leading to a “truly joint decision-making process for research and development priorities, and all procurement decision.”<sup>13</sup> Owens further describes a command chain that would be flattened and remove intermediate layers of bureaucracy. Powerful networks could produce a COP in a centralized fashion then relay critical battlespace information and commands directly from leaders to combatants.<sup>14</sup> As with NCW, it is not difficult to envision a flattened command chain leading to a tendency towards centralized execution as operational commanders are presented with more and more real time information and have the capability to communicate with tactical units

From a technology acquisition perspective it remains unclear how either NCW or system of systems proposes to implement its concepts, which is no small matter. Within the DoD a serious debate is underway, at the ones and zeros level, regarding how

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<sup>13</sup> Ibid., p. 203.

<sup>14</sup> Ibid., p. 205.

“interoperability” will be achieved, thus enabling either concept. While the debate bogs down in technical issues such as whether interoperability should occur at the data layer versus the application layer (“thin client” versus “thick client”) the fundamental issue hidden in the jargon is to what degree will platforms be able to process data autonomously in the event of failure of the network or isolation of a participant from the network. Both NCW and system of system proponents advocate decentralized command. Considering the level of autonomy each concept produces offers insights into how much advocacy each concept gives to decentralized command. The level of advocacy is discussed later.

### **How is the COP developed today?**

Two doctrinal documents regarding development of a COP are the Chairman, Joint Chiefs of Staff Manual 3115.01, Joint Data Networks (JDN) Operations Manual; and Chairman, Joint Chiefs of Staff Instruction 3151.01, Global Command and Control System (GCCS) Common Operation Picture (COP) Reporting Requirements. The Joint Data Networks Operations Manual devotes more attention to the process of getting the data that is used to develop the Common Operational Picture. Because of the differences in where data comes from, the GCCS COP is not the same as the COP developed using the process outlined in the JDN Operations Manual. This text will expand on the JDN method since the COP produced using this method is closer to real time and in architecture more closely resembles the COP as NCW and system of systems would develop it.

The COP is developed by correlating and fusing data from multiple dissimilar data sources such as tactical data links, intelligence systems, sensor networks and ground networks. Currently, tactical data links provide the bulk of data that constitutes the COP.

While tactical data links do provide the commander with large amounts of data, the data is often provided by multiple overlapping sensor systems and data links are not capable of automatically managing redundant and erroneous data and fusing it into a COP. The result is that the best situational awareness resides at those levels of command which operate the ISR systems that develop the data and have enough familiarity with the data to extrapolate knowledge.

Eliminating propagation of faulty and redundant data across sub-networks and preventing faulty data from entering the COP “requires extensive cross-checking and filtering, driving up the information processing burden.”<sup>15</sup> To address this issue the Joint Data Network Operations Manual (CJCSM 3115.01) created the requirement for a Joint Interface Control Officer (JICO) to manage the data created and shared by numerous participants on the multi-tactical data link network. Implementing the JICO to manage tactical data links has successfully improved the CTP and thereby improved the COP. It has been demonstrated at Millennium Challenge 02, Joint Combat Identification Evaluation Team 02, as well as during Operation Enduring Freedom and Operation Iraqi Freedom. The concept has been so successful that the JICO has been pressed into serving the higher level job of JDN Operations Officer who is responsible for architecting and coordinating with the managers of all the networks that contribute data to the COP (a job for which the JICO is not trained and is not supported by a personnel structure on operational command staffs). The need for COP managers is being addressed in a revised CJCSM 3115.01.

### **Discipline - Where technology, the COP and Acquisition cross paths**

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<sup>15</sup> Stuart E. Johnson and Martin C. Libicki, Dominant Battlespace Knowledge: The Winning Edge, (Washington, DC: National Defense University Press 1995), p. 70.

The success of the JDN doctrine, which prescribes data management discipline, causes one to consider just why it took nearly two decades to realize that information technology systems like tactical data links require doctrine, organization, training and personnel to realize their potential.

In the world of information technology and C4ISR there is a prevailing lack of discipline in acquisition and implementation of systems. The tendency is to build high technology equipment *then* find an existing combat system to parse it into; leaving someone else to deal with considerations like who will operate the new equipment, and what doctrinal, organizational and training changes are necessary to make use of this equipment. From an aviator perspective this is roughly equivalent to building an airplane without training pilots to fly the airplanes or creating squadrons and wings to handle the operations, maintenance, and administrative tasks associated with aviation. To take the aviation analogy one step further, in naval aviation the Naval Air Training and Operating Procedures Standardization (NATOPS) manual is the bible to which naval aviators refer on how to fly the plane. The NATOPS manual is said to be written in blood since it was created as a result of grotesque losses of naval aviators during the Vietnam War. The C4ISR mission has no such manual, and has had no *Vietnam-like event* to motivate the military to increase discipline in this arena.

The Joint Data Networks Operations Manual addresses other networks in addition to tactical data links that contribute to the Common Operational Picture; however, management of these networks and subsequent fusing of data into a COP are not clearly discussed, resulting in a COP that is largely comprised of data from tactical data links. The implication is that additional organizational changes are needed for the commander's COP to gain access to usable data from these other networks (intelligence, netted-sensors, ground networks, etc).

In the absence of organizational change these other networks will either not be displayed to the commander, they will have to be manually entered, or they will be displayed on a stand-alone system. Either way the data will *not* be fused into a COP.<sup>16</sup>

Alberts discusses the complexity of the battlespace and potential ways to decompose the battlespace into what he calls “Information/Resource Spheres.”<sup>17</sup> His concept is to create manageable areas for the distribution of information and decision. In creating the spheres Alberts effectively concedes that a Common Operational Picture may only be common to that community of interest that operates within a given sphere. Each sphere, further, has a single commander to maximize effectiveness of command and control. This is an interesting concept; it may gain traction in doctrine. A practical example might be creating spheres commanded by functional commanders (Joint Force Land Component Commander, Joint Force Air Component Commander, Joint Force Maritime Component Commander or Joint Force Special Operations Component Commander). An obvious friction point in this particular example is the C2 conflict which could arise when one component commander provides resources to another component commander. It is reasonable to conclude that this could be overcome by distinguishing between supporting and supported commander, putting the supported commander in charge.

Each functional commander could be staffed with information managers and tasked with creating an operational architecture and managing the CTP for their area of responsibility. The Combatant Commander or Joint Task Force staff could then draw upon the various resource spheres to develop the COP. Such an arrangement could provide the

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<sup>16</sup> Chairman, Joint Chiefs of Staff Instruction 3151.01A. Global Command and Control System Common Operating Picture Reporting Requirements. 19 January 2002.

<sup>17</sup> Stuart E. Johnson and Martin C. Libicki, Dominant Battlespace Knowledge: The Winning Edge, (Washington, DC: National Defense University Press 1995), p. 96.

organizational structure required to manage data in a disciplined manner that could lead to knowledge on which the commander might act.

### **Impact on Command and Control**

An important C2 consideration is to establish an understanding of the boundaries of where the COP is common and at what point in the chain of command (tactical, operational, strategic) does display of the COP become sufficiently different that it would be imprudent for that level of command to exercise direct authority. In other words, when is the chain of command too flat?

Consider a homeland defense system that can provide a perfect COP from the tactical level all the way to the President. Remember that the COP is not a “view only” common picture, but rather common data that can be manipulated through various filters for display based on the user’s needs. Now consider a chain of command from an F-16, to a JFACC, to Commander NORAD Region, to NORAD, to the President. Each operator in this chain represents a different level of command, with different responsibilities and perspectives, and has different display needs to provide the situational awareness required to fulfill his responsibilities. Consider an extreme case in which responsibility and perspective might lead to vastly different COPs and, therefore, different perspectives and interpretations of the COP. *What is the likelihood that the F-16 pilot and the Commander-in-Chief both have the same picture?* Given access to identical data, two observers at significantly different levels of the chain of command will opt for different filters, thus their picture will not be common. The various staffs will view the data with their own biases, influenced by their experience with the data, and their professional experience with similar situations. It is far more likely that the JFACC and the pilot will have identical COPs and based on closeness to the battlespace

the JFACC is likely to have a more similar perception and understanding of the battlespace than someone higher in the chain of command. Doctrinally speaking, we need to understand how close to the battlespace one must be in order to grasp the context of information. Just how flat can the chain of command get before running the risk of making inappropriate decisions based on an erroneous understanding of the battlespace?

Consider a historical case of differing perspectives resulting from closeness to the battlespace: the German invasion of France in WWII. The German plan was to Blitzkrieg through France before the French Army could react. To execute this plan General Heinz Guderian felt it necessary to be at the *Schwerpunkt* (center of gravity) to have the knowledge of the battlespace required to maintain situational awareness.<sup>18</sup> Guderian's interpretation of events based on his perspective of the battlespace led to conclusions as to the next operational steps that were greatly different from his higher headquarters. In this case Guderian's higher headquarters had the same information as he did, but they did not have the correct perception of what this information meant and how they should proceed. The operational concept was still valid, but being too far from the battlespace to properly perceive events the operational/strategic command began to have doubts. Only Guderian's force of personality allowed him to overcome opposition from higher headquarters to proceed with Blitzkrieg.<sup>19</sup> This case demonstrates how the perception of the battlespace varies with closeness to the source of information. In this instance the tactical, operational and strategic levels of command interpreted the "picture" differently and came to different conclusions about how to proceed.

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<sup>18</sup> Carl H. Builder, Steven C. Bankes and Richard Nordin, Command Concepts: A Theory Derived from the Practice of Command and Control, MR-775-OSD (Santa Monica, CA: Rand, 1999), pp. 51-54.

## **The Information Pie: Global versus Local Sensors**

A study conducted by Project AIR FORCE, the Air Force Federally Funded Research and Development Center (FFRDC), provides cogent analysis of the significance of who creates or provides data and subsequently how that data should be treated from a COP management perspective.<sup>20</sup> Two approaches to dividing information were considered “based on where the raw data comes from.”<sup>21</sup> One approach is sensor-centric in which information systems are built around the sensor. Such a system would have its own tools to command and control sensors and provide interoperable data to users over the Global Information Grid (GIG). A second approach is mission-centric information systems where data may be drawn from global and local sensors and command and control could be in the field, at the JTF, or in CONUS. In contrast to the sensor-centric approach, the mission-centric approach would in some cases passively receive data and in other instances actively take control of sensors for the specific mission-oriented data.

Data from global sensors, such as satellites, can be made broadly available or may be requested from national or regional managers. Local sensors have limited area coverage and are often used for self-protection or to detect enemy units; however, data from local sensors can be correlated with data from global systems. Therefore, it must be made available globally.<sup>22</sup> From this construct comes a command and control challenge: the more sensors

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<sup>19</sup> Len Deighton, *Blitzkrieg: From the Rise of Hitler to the Fall of Dunkirk*, (London, Fakenham Press Limited, 1979), pp. 264-266.

<sup>20</sup> Martin Libicki, *Who Runs What in the Global Information Grid*. MR-1247-AF. (Santa Monica, CA: Rand, 2000)

<sup>21</sup> *Ibid.*, p. 17.

<sup>22</sup> This process is similar the COP management process described in the CJCSM 3115.01 and can be used to greatly enhance the quality of the COP.



employed to cover the same area, the more important centralized command becomes in conducting an effective search; however, as stated above local sensors are often used for self-protection and tactical operators rely upon local sensors to provide local situational awareness. Competition for control of information creates a tension between the needs of the operational and tactical level commanders.

Advocates of system of systems envision a mission-centric approach where data customers can subscribe to information as needed from the Global Information Grid (GIG). In this instance platforms are not provided with autonomous processing capability. This is, I would offer, a strategic level view of how to manage a COP. Dissenting opinion to the system of system/GIG view expresses concern that the needs of tactical level commanders are not met in that construct.<sup>23</sup> An alternate vision argues that tactical commanders must have an autonomous capability to process organic system data, as well as post information to the GIG. This vision is contained within U.S. Joint Forces Command Joint Battle Management Command and Control roadmap.<sup>24</sup> This, however, is an operational level view of how a COP should be developed with a compromising eye toward the needs of the strategic and tactical levels. The Network Centric Warfare approach supports this approach demonstrating a greater degree of advocacy for decentralized execution than that shown by system of systems advocates.

## **Conclusion**

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<sup>23</sup> This vision is also advocated by the Office of the Secretary of Defense for Network Integration and Interoperability (NII). NII see interoperability as occurring at the data layer which necessitates a centralized system of data handling. This vision is challenged by the Office of the Secretary of Defense for Advanced Technology and Logistics (AT&L). AT&L is cautious to centralize command and control of data and advocates that operators must maintain an autonomous processing capability. This in a nutshell is the “thin client / thick client” debate mentioned early in this paper.

<sup>24</sup> U.S. Joint Forces Command, Joint Battle Management Command and Control Roadmap, 22 April 2004.

Given today's technology it is possible to develop a COP. However, given today's military doctrine and organization a COP of the sort described by NCW and system of system visionaries is still far away. What is less certain is whether or not commanders have the Doctrine, Organization and trained Personnel to allow them to accurately perceive and assess the meaning of the COP.

There are numerous organizations and standards that have been created over the years to improve interoperability and develop material and non-material solutions that will make a true COP a reality. In fact there may be too many. A system of systems interoperability study prepared by Carnegie Mellon Software Engineering Institute for the Electronics Systems Command (ESC), Hanscom AFB, study lists 15 organizations and 20 initiatives along with various strategies, architectures and standards all with the objective of providing the type of system integration and interoperability that will lead to a COP.<sup>25</sup> Before a true COP will be realized the reigns will need to be rolled in to focus the efforts of the DoD towards a solution that is practicable. This is not meant in any way to suggest that a compromise in quality is required to get something into field. To the contrary it is meant to suggest that the NCW/system of systems technology required to create the COP is creating a need for a new group of warfighters (like aviators, tank drivers and ship drivers) to make use of the technology. It is ill-advised to believe that automated systems create an environment where commanders can cherry pick information and magically develop situational awareness. The commander will need a trained staff to plan for and utilize the "knowledge" that could be available on the COP.

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<sup>25</sup> Carnegie Mellon Software Engineering Institute, System of Systems Interoperability (SOSI) Final Report, ESC-TR-2004-004 (Pittsburg PA 2004).

### **How can the Services and Combatant Commands improve value of the COP?**

*“an ideal command concept is one that is so prescient, sound, and fully conveyed to subordinates that it would allow the commander to leave the battlefield before the battle commences, with no adverse effect upon the outcome.”<sup>26</sup>*

A good starting point would be for each level of the chain of command to consider what their respective command and control responsibilities are, and what C4ISR information is needed to exercise these responsibilities. The purpose of this mental drill is to recognize the different objectives and needs of the strategic, operational, and tactical commanders and bound these information needs to create a COP that supports their objectives, “rather than creating a C2 system that can transmit all the information that can be acquired.”<sup>27</sup>

Recognition of the different levels of situational awareness required at each echelon will lead to a realization that the COP in each operations center will not be the same. The only thing common in the COP will be the data available for display. Additionally, this may serve to encourage each level of command to remain focused on their respective responsibilities and not succumb to the temptation to micromanage from the top, or to the belief that one has the big picture at the bottom.

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<sup>26</sup> Carl H. Builder, Steven C. Bankes and Richard Nordin, Command Concepts: A Theory Derived from the Practice of Command and Control, MR-775-OSD (Santa Monica, CA: Rand, 1999), p iii.

<sup>27</sup> Ibid., pp xiv-xv.

To advance the understanding and value of the common operational picture it is necessary for the Services and the Combatant Commanders to look at Doctrine, Organization, Training and Personnel.<sup>28</sup>

## **Doctrine**

There is a need to develop C4ISR doctrine to discipline the use and management of information technology. This doctrine needs to recognize that the information created and displayed on the COP isn't there merely to provide the commander with information to react to and spontaneously exercise control. At the operational level the COP should provide the commander with knowledge that allows him to validate his command concept and modify it accordingly when faults are discovered. The doctrine must also recognize that, while the *data available on the COP is identical for all users*, various commands *displays of the COP will not be identical*. As the data moves further from the battlespace and up the chain of command caution must be exercised to avoid assuming that identical conclusions as to the next course of action will be drawn from the COP. To gain maximum knowledge from the data the operational commander will still require context to properly interpret information. To do this he will have to have direct human-to-human communication with lower echelons.

## **Organization**

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<sup>28</sup> Doctrine, Organization, Training, Material, Leadership, Personnel and Facilities (DOTMLPF) is described in the CJCSI 3180.01 (Joint Requirements Oversight Council (JFOC) Programmatic Processes for Joint Experimentation and Joint Resource Change Recommendations). The DOTMLPF process is used when making change proposals to existing joint resources when these changes are not associated with an acquisition program. The purpose is to synchronize material and non-material recommendations to ensure interoperability. In other words avoid operating in a vacuum when making recommendations for change.

There is a need to create, within Combatant Commands, a formalized responsibility for creating and managing the COP. Operational level commands are not currently organized to develop a COP. In lieu of a proper organizational structure outside organizations are relied upon heavily to provide assistance.<sup>29</sup> Management of a COP should be more of a J-3 function than it is a J6 responsibility. It requires understanding what information is required, how to create an operational architecture that can provide this information, and knowing the capabilities and limitations of the systems and technical architectures that provide the data to the COP.

## **Personnel**

People are required to execute the doctrine and fill the billets in an organization that is responsible for developing a COP. There is a need for the Services, as the provider of trained forces, to develop a community of personnel skilled at information technology management. The revised CJCSI 3115, currently in the approval process, addresses the personnel issue and will show that there is a need for people with warfighter backgrounds to create the architectures, and manage/interpret the data on the COP.

## **Training**

To ensure that the COP is accurate and timely the personnel charged with its management need to be trained. As discussed in the aviation analogy, to make use of technology requires people who understand how to operate the new system and how to make use of the system. In other words the personnel must know how to “fight the ship.” It would

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<sup>29</sup> Chairman, Joint Chiefs of Staff Manual 3115.01. Joint Data Networks Operations Manual. 1 September 2001.

be imprudent for the military to merely implement new technology into the commander's operations center and hope for a COP. As we all know "hope is not a course of action."

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## Abstract

### DOES A COMMON OPERATIONAL PICTURE RESULT IN COMMON UNDERSTANDING OF THE BATTLESPACE?

The concept of the Common Operational Picture (COP) was created to provide the operational commander with improved situational awareness. Numerous organizations have developed conceptual frameworks regarding the technical aspects of developing a COP. Two notable frameworks are the Network Centric Warfare, and System of Systems approaches. In addition to technical challenges, there exists a need to address the proper display, use, and interpretation of the data contained in the COP.

Each level of command has a unique perspective on issues that enter the staffing process. The COP is no different. Interpretations of the COP may vary with the perspectives and experiences of the staffs. As a result, a common picture may not guarantee a common understanding of the battlespace.

To ensure that the operational commander gets the situational awareness he desires the staffs of the services and the Combatant Commanders need to address doctrinal, personnel, training and organizational issues. Failure to do so will at best result in inefficiencies, and at worst could lead to serious misunderstandings in the battlespace.



